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AUTHOR	Evans, N. Dean, Ed.
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ABSTRACT

Since its inception in 1969, Burlington County College (New Jersey) has been dedicated to implementing a systematically designed approach to instruction and student learning. The core elements of the approach are as follows: (1) development of a basic college philosophy; (2) specification of general institutional objectives; (3) selection of curricular programs and statement of basic goals; (4) advance definition of outcomes of the teaching-learning process; (5) development of an orderly plan to move from a definition of outcomes to their attainment; and (6) planning for the collection of feedback. It is felt that a systems approach improves learning because it is based on well-defined, measurable outcomes. A "Three-Phase Systematic Instructional Development Model" outlines events that should be completed and suggests an order for their accomplishment. For each of the following, a three-phase procedural model has been designed: student learning needs are analyzed; learning objectives and test items are written; teaching-learning strategies are designed; teaching-learning strategies are implemented; learning outcomes are evaluated; and objectives and strategies are revised. (CA)

June 1971

INSTRUCTIONAL SYSTEMS FOR STUDENT LEARNING: THE BURLINGTON COUNTY COLLEGE APPROACH

Edited by Dr. N. Dean Evans, President

Burlington County College has, since its inception, been dedicated to implementing a systematically designed approach to instruction and student learning. The core elements of the systems approach can be concisely stated:

1. From the identified values and needs of society, a basic philosophy for the college is developed.[1]
2. General institutional objectives are specified.[2]
3. Curricular programs are selected and basic goals stated.[3]
4. For each course or learning sequence, outcomes that are to result from the teaching-learning process are defined in advance.
5. An orderly plan or scheme is devised to move from definition of outcomes to their attainment.
6. Feedback is planned as part of the system so that evaluative information may be employed in modifying the system.

The educational endeavor in which we are engaged is a unique one, for it is an institution-wide experiment with a particular type of educational innovation. There are presently no perfected systems for us to emulate. As a new institution, we have faced the tremendous task of developing our own educational design. Such experimentation means hard work and problems as well as the satisfaction of accomplishment. As members of

1 - BCC Bulletin: 1970-72, p. 11.
2 - IBID., pp. 11-12
3 - Supplement to the Bulletin: 1970-72

this college community, most of us have worked and worried for many long hours. The efforts of many in this pioneer endeavor are recognized and the anxieties understood. Now that we are preparing to occupy our new campus designed specifically for the systems approach to education, it is time to review the college philosophy and the process of systems. This paper is a composite of what we have learned at Burlington County College during the past two years, and suggests directions for the immediate future.

Those who founded and organized the college chose to implement a systematic approach to student learning primarily because educational research has indicated that considerable learning gains can be achieved through the use of such a process. Also, the general public, who supports the college financially, and many people within the educational establishment as well, have become increasingly concerned about the outcomes of education in relation to the constantly rising costs. We in education have for years concentrated on instructional process rather than on learning outcomes because of the supposedly vague and indefinable nature of our product. However, if we are to command continuing support, we must define our objectives and exhibit the results of our endeavors. This is accountability, and we have been committed to the concept at Burlington County College long before the term became an educational byword of the 1970's.

How, then, does a systems approach improve learning? The systems approach helps because it is based upon objectives -- i.e., well defined, measurable outcomes. Why are such objectives important? We cannot prove that we have done anything until we explicitly define what it is we are trying to help the learner accomplish -- and then show whether he accomplished it or not.

In our recruiting we have emphasized that the systems approach does require a kind of commitment on the part of the teacher to the tenets of certain educational theorists such as Skinner, Bloom, Mager and Popham, and to rather explicit instructional practices designed around behavioral learning objectives. We have discovered through experience that this approach to learning calls for a substantial change in the teacher's professional role concepts and his traditional supremacy in the classroom, and it also demands a great deal more time and effort in planning and preparation, and in work with individual students. It is true that commitment and extra effort are necessary for successful experience in an institution such as ours, but the role of the teacher, though changed somewhat from the traditional, is not diminished. The system cannot function without the master teacher, although his role is certainly different and more challenging.

Let us examine some of the implications, for both faculty and administrators, inherent in this new approach. We are asked to view learning not in terms of some vague and mysterious subjective process, but rather in terms of some objective and

observable indication on the part of the student that he has acquired some new knowledge, capability or attitude that he did not possess before exposure to the system. We are also asked to modify our traditional role expectations concerning teaching -- from that of a tri-weekly, center stage performer and information dispenser to that of a planner, strategist, and instructional manager, using the facilities and resources of the institution, and our special knowledge and skills to bring about the desired changes in student behavior.

Instructional management as the term is used above, refers to a program of deliberate activities leading to a form of systematic instruction. As the system evolves and our managerial skills improve, greater proficiency in defining outcomes and designing instructional strategies will be attained. The goal of systematic instructional management is to more objectively define, achieve and measure instructional outcomes in terms of learner behavior.

At B.C.C. a number of instructional strategies using different modes of instruction and various learning resources are available to the teacher or instructional manager. The aim is to individualize instruction as much as possible through the appropriate modes, such as seminar, independent study, and large group instruction. All courses cannot and should not be designed to use all available instructional modes, nor are all instructors expected to employ the same methodologies in the same way. However, budgetary realities require a balancing of large group, laboratory,

classroom, independent study, and seminars to achieve a mix that can be supported economically, and that will individualize instruction at the same time.

Much work also remains to be done in the area of evaluation. Changes in student cognitive and affective learning, and attitudes toward learning, are not always easily assessed. Many of our efforts at evaluation are and will continue to be quite primitive -- but that is understood. Let it be said here that miracles are not expected, and none of us who has honestly tried, yet failed, to fully measure student change need despair. Experimentation is always fraught with some failure and further challenge. This is accepted as part of the experimental process at Burlington County College. Yet we must attempt to measure student change -- even in so emotive an area as the arts. Walter Kaufmann, whose philosophic inclinations are toward existentialism, has said:

> Whoever reads a major work of literature without in any way becoming different or changing his outlook on the world has missed what matters most....
>
> We do not simply appreciate Mozart, agree with him, or classify him.... He makes us aware of possibilities that would never have occurred to us; he affects our tastes, not only in music; he influences our attitudes, our values, our aims.[4]

Many educators, including some at B.C.C., fear that technology may dominate and dehumanize learning within a rigid systems framework. Yet we can prevent the medium from becoming the message (to paraphrase Marshall McLuhan). If the college is student-oriented, and specific objectives are written with

4 - Kaufmann, Walter. Critique of Religion and Philosophy. New York: Doubleday and Company, Inc., 1961. pp. 406-407. (The above quote aptly describes what Bloom and Krathwohl call the affective domain.)

student learning needs in mind, then the various learning modes available on the new B.C.C. campus can be humanistically employed to help achieve the objectives. Some of the modes will involve various media, the computer, and other technological aids. Our campus is designed for the employment of a variety of instructional strategies. For example, educational technology can be very efficiently utilized in teaching many basic cognitive skills. Such efficiency at this level can free the instructor for the kind of teacher-student inter-action that only human beings can employ. If the teacher can be freed to inspire, motivate and enable the individual student to learn, then educational technology will have justified its existence.

An educational system is no better than the people who design and implement it. No amount of paper planning and electronic gadgetry will accomplish the objectives of an institution unless the people involved have a unity and commitment to the system and to the objectives. It is realized that in asking for a reexamination of the basic concepts of the teaching-learning process, with an eye toward acceptance of new values, more may be requested than can be delivered in a year or two from the opening of a new college. Again, miracles are not expected, although some have been performed at Burlington County College since September, 1969. It is expected, however, that everyone give the systems approach a chance to work by honestly trying it. Our obligation to the philosophy and institutional goals

of the college demand such a commitment, and we should strive for reasonable progress each year. One question that always comes to mind is, "Why did I come here?" All of us are part of an institution that is committed to breaking with tradition in the teaching-learning process. It is probably true that most of us came to Burlington County College because we were dissatisfied with many of the traditional approaches to education. We chose to break with tradition and to experiment with a particular type of educational innovation. Collectively, this has meant a large commitment in terms of human resources, time, money, and campus facilities.

The process that we have begun here is an exciting one and it will always be challenging. Educational theory is not easily turned into institutional fact. When we chose to undertake this venture, all of us were asked to make a commitment to the institution's philosophy and goals. This request still stands. In the final analysis, an educational system is the persons who comprise it -- and it is no better than these people choose to make it. Our rewards here at Burlington County College will be commensurate with our efforts.

Assuming that we are committed to implementing this system, our next question is most likely to be: "Precisely what is required? What tasks am I to perform and in what order am I to perform them in this new process of instruction?"

The next section of this paper discusses implementation of the instructional systems approach at B.C.C.

SYSTEMATIC INSTRUCTIONAL DEVELOPMENT

From early in this institution's history our goal has been to provide meaningful and productive learning experiences for our students. As a corollary to this goal it has been assumed that in order to provide quality in the learning process there must be systematic instructional development. Instruction should be a purposeful experience which employs the most effective learning devices and procedures available. Systematic instructional development is not an end in itself; it is a means to the end of effective and efficient learning for our students.

To clarify what is meant by systematic instructional development, a model is attached to this paper which outlines rather precisely events that should be completed, and a suggested order for the accomplishment of these events. (Please refer to this model as you read the rest of the paper). The model is called a "Three Phase Systematic Instructional Development Model." It is divided into two parts. Part One outlines the activities which must be completed in organizing and executing any course of study -- every time that it is offered to students. Part Two outlines the activities that must be completed at three different levels of sophistication in the instructional development process. Phase I is the simplest, most straight-forward level; Phase II represents extended activities in the area of validation, and Phase III is a highly sophisticated procedure in which the instructional development is handled in a controlled, experimental framework. An instructional development project which

proceeds through each level could be expected to last from three to five years and would produce one of the most comprehensive and flexible learning procedures available for our students.

Let's analyze each part of this model and determine exactly what you, as an instructor, would do at each level. Part One is a function level analysis of what a teacher should do when offering a course of study to his students. It starts with an analysis of student learning needs -- a fundamental curricular function. Factors to be considered at this level are: content relevant for the student, societal needs being met by the course, and content requirements. These are fundamental decisions, not to be treated lightly. You have your own experience and training to draw upon, however, as well as the literature in the field and the experience of your colleagues and divisional chairman. The learning needs analysis is basically a research and review procedure which should culminate in a written statement of goals to be accomplished in the course of study. This process must be completed before any other work is done.

Using the outline of concepts and attitudes which were identified in the learning needs analysis, you are now ready to begin writing learning objectives. Each of these objectives should be directly linked to a concept or attitude stated in your needs analysis. The specificity of each objective will vary depending on which development phase is being pursued, but at all times the objectives should be written in such a way that the student has a clear idea of what he must do to

accomplish the objective.

Cognitive objectives involve simple recall or remembering, but also can include reasoning, problem solving, and concept formation. Affective objectives are expressed as interests, attitudes, appreciations, and values. The psychomotor objectives emphasize some muscular or motor skill or act which requires a neuro-muscular coordination.

Well-written behavioral objectives state: (1) the behavior that the learner will be able to demonstrate to indicate that he has achieved the objective; (2) the conditions under which he will demonstrate his achievement of the objective; and (3) the specific criterion or standard of performance.

An integral part of each objective should be the test items or evaluative device which is necessary to determine if the objective has been accomplished. These test items or procedures should be written immediately upon completion of the objective. Writing the objectives and test items simultaneously has the advantage of providing an instant internal checking device. Good and bad objectives and items are usually spotted by the developer at this point and are included or scrapped immediately.

Writing objectives and test items is an ongoing instructional development activity. You should plan to spend up to eight hours per week in writing and reviewing objectives and items. Plan to make considerable use of the support personnel who are provided for you, including your division chairman, appropriate coordinators, and the instructional development officer.

The third function which you should perform is the designing of appropriate teaching/learning strategies for the level of development in which you are engaging. A Phase I project, for example, would basically entail constructing one instructional track which would be followed by all of the students in a course. This might make use of a number of instructional modes such as large group, directed independent study and seminar. More advanced projects will later be constructed using a multi-track approach which will have different students engaged in different learning activities as they accomplish the common objectives of the course. Different approaches may include highly mediated large group or independent study activity, self-paced learning using programmed materials, student contracts in which the student may use his own strategy to reach a mutually agreed-upon objective, or any number of modes and techniques which you may design. This is real individualization of instruction.

In developing content and teaching/learning strategies, the instructor is faced with difficult decisions of selecting from the mass of knowledge that is rapidly accumulating in each discipline. In most cases he will do well to stress the method of inquiry in the particular discipline. This enables the student to learn how a physicist solves problems, for example, so that he can continue to learn and solve problems after he completes the present learning sequences. By stressing the method of inquiry the student sees that real learning involves the process of inquiry and discovery that lead to exploration, experimentation, questioning, and debate. In building instructional sequences is important to include opportunities for observation,

reflection, and problem-solving. Learners become more self-motivated as they discover opportunities to form their own concepts, generalizations and insights. The learning process, then, ought to involve dynamic methods of inquiry and ways of thinking which are self-generating and self-motivating, and which help the learner to identify and follow his own purposes, and relate them to the stated objectives. It is important to help the student to develop the skills of investigation and inquiry that will enable him to continue to educate himself.

While the student is developing his skills leading to the goal of self-directed education, it is the instructor's responsibility to provide meaningful learning opportunities.

Faculty activities in designing teaching/learning strategies may include writing course syllabi, learning packets or modules; writing scripts and storyboards; identifying and ordering commercially available materials and components for instructional programs; writing self-instructional packages; and working with the support personnel within the institution. Your division chairman will be a major assist to you, along with the instructional development officer in the dean's office and the personnel of the Division of Learning Resources.

The implementation stage of instructional development is the closest you will come to engaging in "teaching" activity. Here you subject the product of your work to the pragmatic test -- does it work with students? This is sometimes a shattering but very revealing experience.

Although students may be working with your materials at anytime during the course, you usually should spend no more than a third of your effort in implementation type activities. These will include lecturing to groups, leading seminar discussions, monitoring laboratories, or meeting with individuals or small groups for individualized instruction. At Burlington County College, faculty members are consistently asked the very hard question, "How much of your time must be spent directly with students in order to make their learning an effective and meaningful experience?" You will probably discover that as you proceed into more advanced instructional development projects, you will spend less time in actual implementation and more time in development and revision. The purpose is not to remove teachers from students but rather to put students and teachers together when the contact is most advantageous to the students. Very often, implementation type instructional activities can be carried out by para-professional and technical people and, as our needs develop in this direction, the idea of differentiated staffing will become more workable. Probably the greatest assistance in the implementation step of instruction will be from the staff of the Division of Learning Resources. This group is specifically charged with the responsibility of servicing faculty requests for instructional support and has the facilities, resources, and personnel to assist you.

Evaluation, the next step in systematic instructional development, is one of the most crucial parts of the whole procedure. Evaluation is a two-pronged process. First, the

faculty member is responsible for evaluating the student learning as it occurs. Secondly, it is essential to evaluate the effectiveness of the instructional design and to report the conclusions. Learning outcomes are measurements of how well the students mastered the objectives. This is determined by evaluating the responses to the test items which were constructed to match the objectives. Measuring learning outcomes may be more subjective when objectives in the affective domain are used.

Evaluating the instructional process becomes a more complicated procedure. To assist in making this evaluation, it is necessary to devise a data-collecting mechanism for each instructional sequence. This mechanism can take many forms from an anecdotal type journal or log to a precise error rate indicator. The level of sophistication of the project will help to determine which kinds of evaluation devices will be needed.

An overall goal of the evaluation process is the systematic movement toward validated instructional sequences. Validation will become more important to the instructional developer as he proceeds into Phases II and III.

Evaluation is an ongoing instructional development activity. At the end of a course of study the time spent on this activity will increase significantly while you are analyzing, summarizing, and reporting your evaluations, but it should be noted that during this period, design and implementation activities will be sharply curtailed.

The report which you prepare as the final evaluative activity will be submitted to your division chairman. You will have the assistance of your chairman in creating this report and you should call upon the instructional development officer as well. The report is intended to be an accurate indicator of where you are in the development of a course of study based on your most recent try-out. The extent of the report and the time it requires for completion will vary with the complexity of the instructional development project and with the individual.

The final step in the functional level of the systematic instructional development model is basically a decision point. The decision you must make is directly related to the level of curriculum development in which you are engaged. You must decide, based upon the work you have done and the data which you have generated, whether or not to repeat the course at Phase I or II or to advance to the next phase of development. This decision should be made with a good deal of thought. Again your chairman and the instructional development officer should be involved in this decision.

This has been a brief overview of Part One of the "Three-Phase Systematic Instruction Development Model". Let's turn to Part Two and a discussion of the activities and implications of each of the three phases.

Please examine Part Two, noting the activities that are suggested in each phase as they relate to the activities outlined in Part One.

As you can see, the steps in each of the phases relate directly back to the functions outlined in Part One. This means that each time you proceed through one of the phases of instructional development, you will be repeating the same functions but at a more complex level of sophistication. In this regard, instructional development must be considered a cyclic, spiraling phenomenon, in which each cycle is based upon the previous cycle, but is distinct in terms of complexity and exactness.

Phase I, for example, is a relatively simple procedure which closely resembles a traditional course structure. There are significant differences, however, particularly in the experimental attitude which the instructor/developer must use in completing the project. For example, each step is carefully documented and these documents become the foundation upon which the remainder of the entire project will be built. Objectives are written using behavioral terminology as much as possible. Test items are constructed to match objectives directly. Packets are written to communicate to the student what learning is expected of him and what he must do to demonstrate that this learning has occurred.

A Phase I project is usually designed with only one instructional track. Instructors may use different instructional modes but every student in the course will generally perform the same

learning activities in reaching the objectives of the course. Evaluation of a Phase I project usually centers on such factors as drop-out rate and grade distribution, but an important new factor is how well the students mastered each of the stated objectives. This analysis furnishes the foundation for deciding to repeat Phase I the next time the course is offered or to proceed to a Phase II instructional development project.

Phase II is a much more precise, experimental type of instructional development. It is characterized by the concept of validation. Each step is predicated upon the idea that the learning experiences provided should prove themselves to be valid when they are carefully reviewed. Each part should function adequately to insure that acceptable levels of learning are being attained.

The process in Phase II starts with a student needs analysis which is based upon the content analysis from Phase I compared with the student reactions which were also generated in the first phase. From this analysis a more valid student needs statement can be written, based on content and student input. With this new needs analysis, the instructional developer can then write a much more valid set of objectives. Because of the total experience of the Phase I activities, the instructor/developer can also write the objectives in a much more precise form. When writing the objectives for a Phase II project, considerable attention should be given to the level of complexity of both the cognitive and affective objectives as well.

Two other elements which characterize a Phase II instructional development project are a comprehensive course syllabus and a multiple track instructional design. These two developments occur in the new design for teaching-learning strategies. The syllabus is a rather explicit statement of knowledges, skills, and attitudes which are to be developed during the course of study. The syllabus is also explicit as to how the course is organized and the activities which a student must accomplish in order to complete the course.

The development of multiple tracks is one of the most challenging development activities. Based on the behaviorally stated objectives, each instructional track must be carefully outlined to be parallel but not similar. Different modes of instruction may be utilized on each track but the principle behind the idea of tracking is to allow the student to select a pathway which is most suited for his learning needs and style. Some tracks may be very traditional in structure, others may be quite open to student design, but the terminal product if each track should be equivalent learning based on criteria-oriented evaluation techniques.

Evaluation of a Phase II instructional development project will be a rather extensive match/mismatch procedure which compares outcomes directly to objectives. The skill of the instructional developer will be even more essential here because evaluation of learning outcomes will be a very objective procedure.

Finally, at the end of evaluation of a Phase II project a decision must be made. There is always the possibility of modifying and repeating the project. The other option is to move to a Phase III project and the refining procedure which this kind of advanced project requires.

Phase III is a highly experimental procedure in which the entire development process is completely reviewed, and research and experimental techniques are utilized at the application level. Learning needs are assembled in terms of institutional philosophy and goals, appropriate content, student input and societal impact. Validated course goals are generated which take each of these factors into consideration.

From these goals course objectives are written which are behavioral in format and adhere to a defined hierarchy in both the cognitive and affective domains. Task analysis techniques should be used to generate the course objectives and careful documentation should be kept on the effectiveness of each objective and instructional procedure which spins off the objective. Each of the objectives written will specify the operational tolerances which will be acceptable and the process will be refined until these tolerances are being consistently maintained.

Teaching-learning strategies should be generated to complement a precisely written experimental design. This experimental design should have internal checking components which will automatically monitor the progress of the student as he proceeds in his learning tasks. Again, multiple tracks will be employed

to guarantee that a student is not hindered by the form of his learning experience. A good deal of individualized attention will be necessary in order to determine the effectiveness of the experimental design in light of the specified operational tolerances.

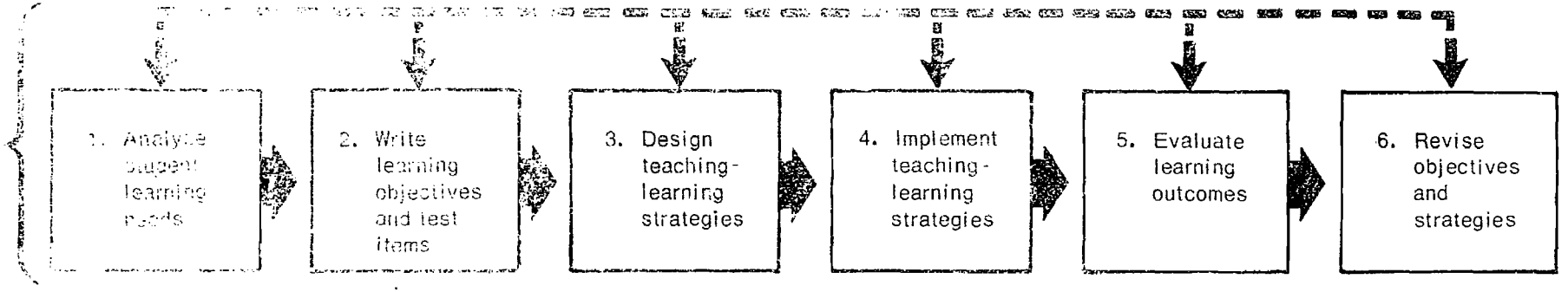
Although evaluation is an ongoing activity at every phase of instructional development, it will be particularly evident in a Phase III project. Because of the nature of an experimental design, considerable evaluative data will be generated constantly. It will be necessary to devise procedures to properly interpret this data and to translate it into a form which will lead the developer to make revisions. Through this feedback and revision process, the instructional developer will be able to "tune" the course of study on each of the instructional tracks until student performance is consistently within the acceptable operational tolerances range.

Time is a major consideration in systematic instructional development. A new attitude toward lead time is necessary for the kind of instructional development that has been outlined in this paper. The time frames suggested on the model should be reviewed again here. These time frames are cumulative. Phase I projects will take one or two semesters. Phase II projects will take one or possibly two years, depending on how often the course is offered. Phase III projects are definitely long range propositions. They often will take two to three years to complete. Availability of time and resources for instructional development projects will affect the suggested time frames.

Our goal as a college is constant: to assure the most meaningful learning experiences we can offer our students. If systematic instructional development procedures can help us toward this goal, they will be worth all of the time and resources that we invest in them.

It is hoped that this paper will become the basis of many discussions among the instructional and administrative staffs, especially at the divisional level. It can also aid in our study and evaluation of the philosophy and institutional objectives of the college, so that all concerned persons may be involved in helping to chart the future course of this community college. Our system is evolving, and we are all contributors to the process as well as learners. No one of us has possession of ultimate truth in the processes of student learning. We will continue to seek it together.

THE THREE-PHASE SYSTEMATIC INSTRUCTIONAL DEVELOPMENT MODEL



PHASE I (one or two semesters) a. Perform student analysis	a. Faculty learn about behavioral objectives b. Write tentative objectives c. Write at least three test items for each objective	a. Write one procedure based on 1 and 2 b. Use the tentative objectives in packet format	a. Conduct the course using tentative objectives and packets	a. Conduct course evaluations b. Analyze outcomes of course c. Report outcomes	a. Decide whether to proceed to Phase II or to repeat Phase I
PHASE II (one year) a. Perform student needs analysis	a. Analyze and rewrite all previous objectives and add or delete as necessary b. Write carefully stated behavioral objectives c. Write at least five parallel test items and validate	a. Write a comprehensive course syllabus based on previous experience and new input b. Design at least two tracks within this course structure	a. Implement the new courses	a. In each track design and implement an alternate evaluation procedure for each objective b. Perform match/mismatch analysis on objectives and outcomes c. Report results	a. Decide whether to proceed to Phase III or to repeat Phase II
PHASE III (two to three years) a. Create validated course goals	a. Rewrite all objectives to match the validated course goals using task analysis techniques b. Review item bank holding, revise as necessary	a. Write an experimental design which will validate each instructional track within the course of study	a. Execute the experimental design on each track	a. Implement the evaluation procedure in the experimental design b. Report results of each trial	a. Repeat Phase III until the learning output is within experimental design operational tolerances